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ABSTRACT

The purpose of the Ohio College Library Center (OCLC) computerized regional library system is to provide an on-line system that makes available to faculty and students in individual colleges and universities the library resources throughout a region, while at the same time decelerating the rate of rise of per-student library costs. The research and development culminated in the successful implementation of an on-line union catalog and shared cataloging system. The final report of the project is LI 004 422. This document appendix twenty-eight, The Ohio College Library Center Program/Subroutine Documentation. Build Print Tape (BPT). BPT is the last step in the formatting of catalog cards. BPT has as input, the formatted records from the Catalog Card Format Program. The out-put from BPT is a tape of line images ready for printing. The primary function of BPT is to format each input record from CCFP into line images to be printed two across on the card stock. The first half of the run being printed on the left side, and the second half being printed on the right side. Secondary functions of BPT include setting up for pack divider cards, and setting up the accounting and billing information. (Other appendices are LI 004 423 through LI 004 427.) (Author/SJ)

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Final Report

Project No. 9-0554
Contract No. OEC-0-70-2289 (506)

June 1973

THE DEVELOPMENT OF A COMPUTERIZED REGIONAL LIBRARY SYSTEM

APPENDIX 28

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LI 004 428

APPENDICES

I. Instruction Manual for Catalog Production. (LI 004 423)

II. Manual for OCLC Catalog Card Production; Revised and Enlarged. Judith Hopkins. (LI 004 423)

III. Creation of Machine Readable Catalog Entries; An Adaptation of the "Data Preparation Manual: MARC Editors." (LI 004 423)

IV. Cataloging on a Cathode Ray Tube Terminal. (LI 004 423)

V. Brief Description of the Serials Control System: A Preliminary Report. (LI 004 424)

VI. A Preliminary Description of the OCLC Serials Control System. (LI 004 424)

VII. Manual for Checking-In, Binding, and Claiming of Serials on a CRT Terminal - Draft of Preliminary Procedures. (LI 004 424)

VIII. Suggested Minimum Requirements for Serials Cataloging. (LI 004 424)

IX. OCLC Technical Processing System - A Preliminary Outline. (LI 004 424)

X. The Technical Processing System, May 1972. (LI 004 424)

XI. Recommended Standards for the Cataloging of Serials. (LI 004 424)

XII. Standards for Input Cataloging. (LI 004 424)

XIII. The Technical Processing System, August 1972. (LI 004 424)

XIV. Ohio College Library Center Annual Report, 1971/1972. (LI 004 424)

XV. Large On-Line Files of Bibliographic Data: An Efficient Design and a Mathematical Predictor of Retrieval Behavior. P.L. Long, K.B.L. Rastogi, J.E. Rush and J.A. Wyckoff. (Not Available EDRS)

XVI. OCLC Systems: Technical Aspects. Phillip Long. and Ohio State University Libraries Systems. Gerry D. Guthrie. (Not Available EDRS)

XVII. Name-Title Entry Retrieval from a MARC File. Philip L. Long and Frederick G. Kilgour. (Not Available EDRS)

XVIII. A Truncated Search Key Title Index. Philip L. Long and Frederick G. Kilgour. (Not Available EDRS)

XIX. Title-Only Entries Retrieved by Use of Truncated Search Keys. Frederick G. Kilgour, Philip L. Long, Eugene B. Leiderman and Alan L. Landgraf. (Not Available EDRS)

XX. Ohio College Library Center Systems. Frederick Kilgour. (Not Available EDRS)

XXI. Evolving, Computerizing, Personalizing. Frederick Kilgour. (Not Available EDRS)

XXII. The Shared Cataloging System of the Ohio College Library Center. Frederick G. Kilgour, Philip L. Long, Alan L. Landgraf, and John W. Wyckoff. (Not Available EDRS)

XXIII. Cataloging with a Computer - OCLC Comes to Pennsylvania. Robert C. Stewart. (Not Available EDRS)

XXIV. The Ohio College Library Center Program/Subroutine Documentation; Master Data Base Update (MDBUPD). (LI 004 425)

XXV. The Ohio College Library Center Program/Subroutine Documentation; Convert Call Number (CNVT). (LI 004 426)

XXVI. The Ohio College Library Center Program/Subroutine Documentation; Generate Pack Definition Tables (GENPDTS). (LI 004 427)

XXVII. The Ohio College Library Center Program/Subroutine Documentation; Catalog Card Format Program (CCFP). (LI 004 427)

XXVIII. The Ohio College Library Center Program/Subroutine Documentation; Build Print Tape (BPT). (LI 004 428)

XXVIII

THE OHIO COLLEGE LIBRARY CENTER
PROGRAM/SUBROUTINE DOCUMENTATION

Build Print Tape
(BPT)

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I. OVERVIEW

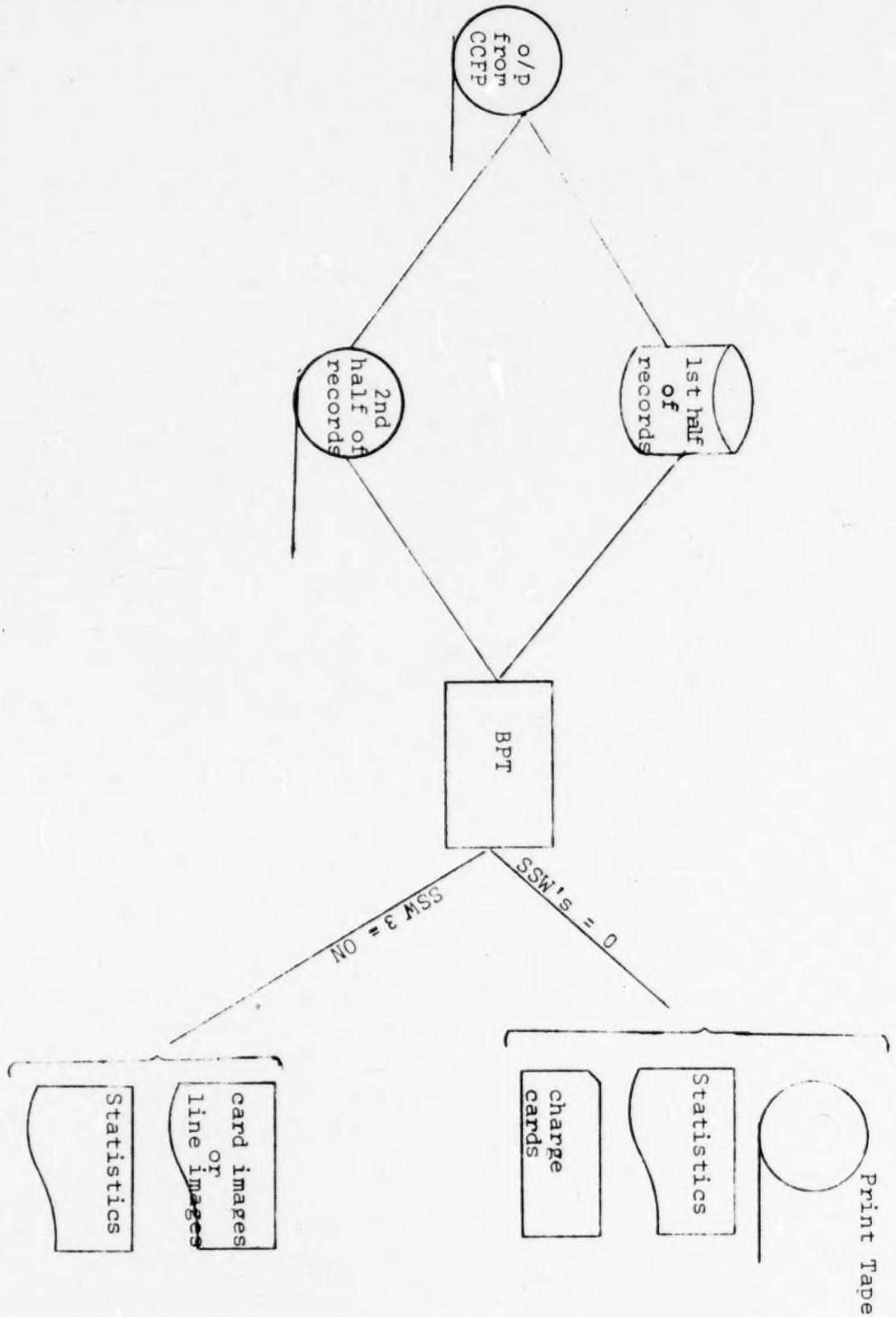
BPT (Build Print Tape) is the last step in the formatting of catalog cards. BPT has as input, the formatted records from CCFP (Format). The out-put from BPT is a tape of line images ready for printing. BPT can also be run for testing purposes with the card images going directly to the LO device if sense switch '3' is turned ON.

The primary function of BPT is to format each input record from CCFP into line images to be printed two across on the card stock. The first half of the run being printed on the left side, and the second half being printed on the right side.

Secondary functions of BPT include setting up for pack divider cards, and setting up the accounting and billing information.

PROGRAM: BPT

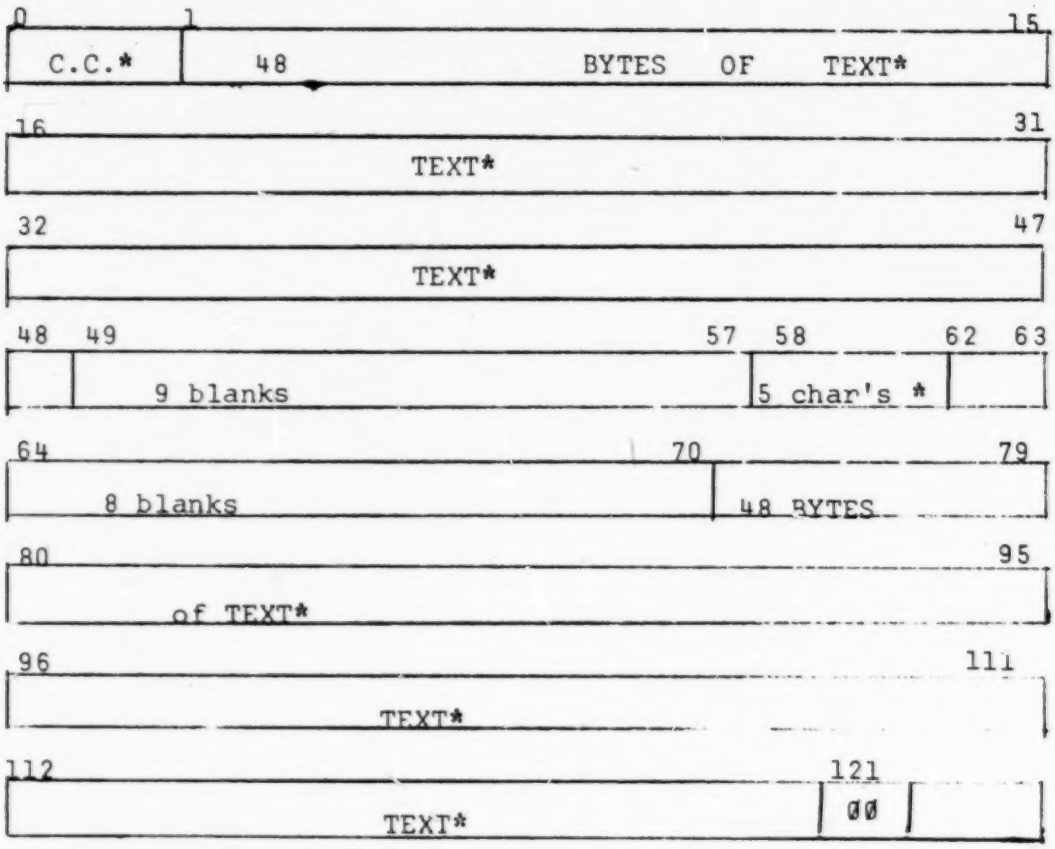
II. DATA FLOW



III. SUMMARY OF INPUT AND OUTPUT

Application PRINT TAPE LAYOUT Date 12/29/72 Page 1 of 1

Procedure _____ Drawn by T.Beckett



TEXT - one of the following:

1) lower case w's
2) border
3) blanks
4) card line image

C.C. - one of the following:

1) x'40' -- single space
2) x'F0' -- double space
3) x'b0' -- triple space
4) x'F1' -- skip to channel '1' (top of card image)
5) x'F3' -- skip to channel '3' (third line of card image)
6) x'C3' -- skip to channel '12' (bottom of card image)
7) x'4E' -- overprint of preceding line

5 char's - one of the following:

1) blanks
2) center control number (on 1st print line)

OCLC CARD IMAGE PRINT TAPE

Record Format = Fixed Blocked
Logical Record Length = 120 bytes
Blcok Size = OS/360 Standard Label
Label = No Label
Density = 800BPI

The first character of each record is the vertical format control. The following codes are used:

1) X'40' = single space
2) X'F0' = double space
3) X'60' = tripple space
4) X'F1' = skip to channel '1' (top of card image)
5) X'F3' = skip to channel '3' (third line of card image)
6) X'C3' = skip to channel '12' (bottom line of card image)
7) X'4E' = overprint of preceeding line--suppress space

At present card images are printed at 8 lines per inch vertically, and a maximum of 23 lines per card. The card dimensions being 75 mm. x 125mm.

All print characters of the record are represented on the IBM ALA print train.

A control number is located on the first printable line of each card image. It is a five digit number beginning 59 bytes into the record. It is right justified with leading blanks and sequential from card image '1' to the end.

the ohio college library center
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Record Layout

File Name CCFP Output Records

Record Name

Record Type - ( ) Card (X) Tape ( ) Disk ( ) Other

File Organization Sequential Record Size 1200 Block Size 1200

General Description CCFP Output Records contain formatted lines and headings and control information necessary to sort and build the catalog cards.

FIELD NAME AND DESCRIPTION	FIELD POSITION	FIELD LENGTH	FIELD FORMAT
Block size	1 - 2	2	binary
Reserved	3 - 4	2	X'0000'
Record length	5 - 6	2	binary
Reserved	7 - 8	2	X'0000'
Sort tag	9 - 80	72	variable
first tag entry	9 - 13	5	EBCDIC
second tag entry	14- 56	43	variable
third tag entry	57- 80	24	variable
Output record number	81- 82	2	binary
Logical record number (for spanned records)	83- 84	2	binary
Number of cards this record will produce	85- 85	1	binary
Number of extra cards	86- 86	1	binary
Card column for zeroth indention for call numbers	87- 87	1	binary
Card column for zeroth indention for other text lines	88- 88	1	binary
Unused	89- 90	2	X'0000'
Pointer to heading paragraph text	91- 92	2	binary
Pointer to first text paragraph	93- 94	2	binary
Pointer to continuation policy	95- 96	2	binary
Continuation line number for text on extension cards	97- 97	1	binary

Record Layout (Cont)

File Name CCFP Output Records

Record Name

FIELD NAME AND DESCRIPTION	FIELD		
	POSITION	LENGTH	FORMAT
Billing code	98 - 100	3	EBCDIC
Text paragraphs	101- n (n - 1200)	variable	variable

Each paragraph is preceded by its beginning line number and ended by a X'FF'. A X'FF' also begins the call number paragraph followed by the call number beginning line number, then the call number text. X'FD' indicates that a one-byte tab value follows, then text. X'FE' denotes the end of a line within a paragraph. X'FC' indicates that the following byte is a diacritical.

IV. FUNCTIONS

BPT first checks the date and time for this particular production run using the internal date and time. In the case of a rerun or late run, the date and time are input through the console by the operator. If sense switch #2 is 'OFF', the volume serial number of the output tape is requested. A new expiration date is created for this tape so that the tape will not be used again for five working days.

The labeled output tape is then verified. If the output tape label does not match, the operator must either mount the proper tape and continue or abort the job and begin again.

For testing purposes, the sense switches may be set. If sense switch 2 is 'ON', there will be no tape output. If sense switch 3 is 'ON', formatted card images will be printed on the LO device. If sense switch 4 is 'ON', the line images as they appear on tape including overprint lines will be printed on the LO device. The system will enter a 'WAIT' state if both sense switch 3 and 4 are turned 'ON'.

The subroutine RDTA reads the records from the CCFP output tape using 2 swing buffers. These buffers enable main-line processing to continue while the records are being read. As soon as one read is complete in one of the buffers, another read is initiated in the second buffer. The first record read contains a total card count. This count is divided by two and used to spool the first half of the production run to disk. The subroutine WRDI moves the records to a track size buffer (6144 bytes). When this buffer cannot hold another complete record, it is written to disk. The second half of records remain on the tape.

The main-line processing begins at BLDLFT where one record is read from the disk using the subroutine RDDI. This subroutine unblocks the records and passes a single record to the main program. A branch and link is issued to the subroutine BLDCRD where the actual card image is created. Then a branch is taken to BLDRT to read and build one record from the tape. Control is passed from BLDLFT to BLDRT until all records have been built into card images. At this time, processing continues at EOJ to set up the account cards, billing information, and the final statistics.

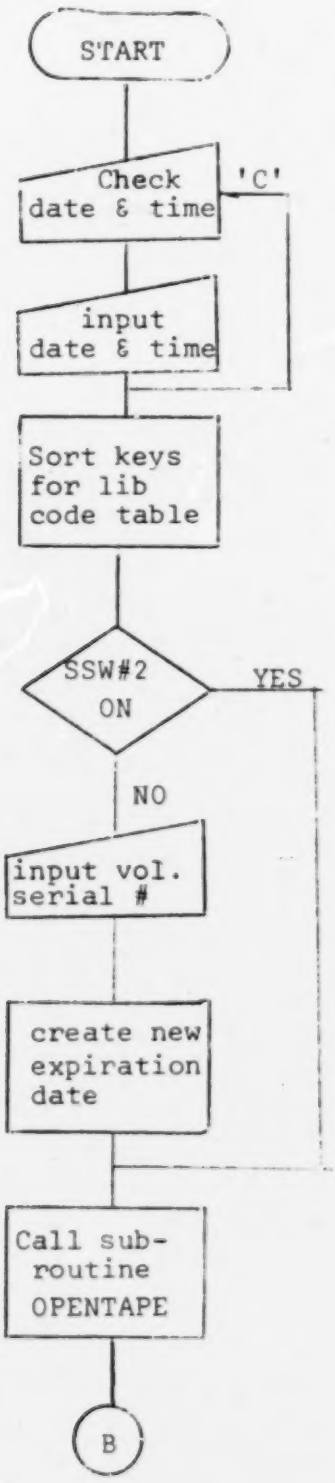
The subroutine BLDCRD issues branch instructions to several subroutines to build the card image. BLDCRD sets up the indentions for the text lines and initiates a branch and link to the subroutine BLDPAR for each paragraph until a card image is formed. The bottom line paragraph is built first. From this the pack I.D. is examined. If it is different from the previous pack I.D. the subroutine STARTPK is used to build a pack divider card. The subroutine SRCHBIL is used to search for the billing code in the institution table, INSTITUT. If the code is not there, it is added at the end of the table.

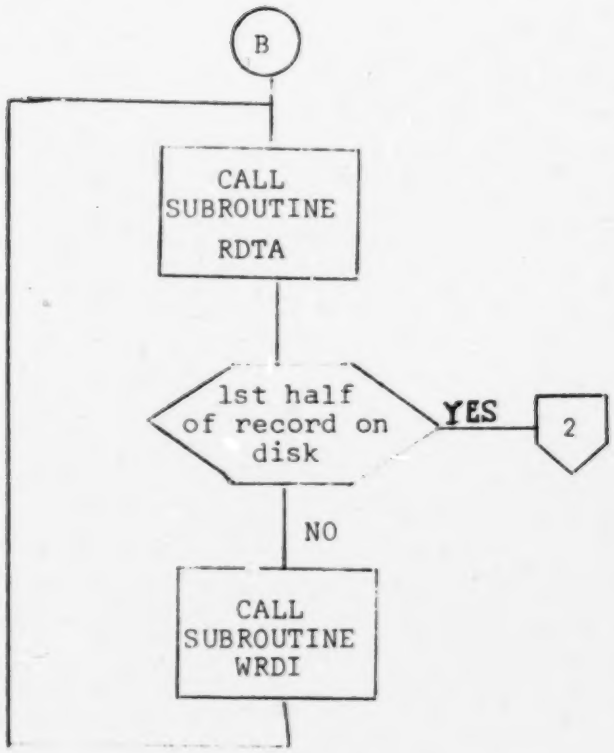
The card count for each billing code is accumulated for EOJ processing and later monthly billing. If there is more than one card needed for a record, the message 'SEE NEXT CARD' is moved to the line below the heading. After all the text lines have been processed, control is passed to the subroutine FULLCRD. Here the parms are set up if the record is to be repeated. Also the condition code 4 is set to 0 if the record is complete, or 1 if another card is required for this record. Control is returned back to BLDLFT.

The subroutine BLDPAR is used to format each paragraph of text and set the line switches for each line. There are 23 line switches associated with each card image. If the line switch is turned 'ON' (=1), there is text to be printed on that line. If the line switch =2, there is one overprint line associated with the text line. If the line switch =3, there are two overprint lines. Any character that is less than X'F9' is moved directly to the output buffer. A X'FC' indicates that the next character is a diacritical and a branch is taken to the subroutine DICRT. A X'FD' indicates that the next character is a tab value and a branch is taken to the subroutine TAB. A X'FE' indicates an end of line and a branch is taken to EOL. A X'FF' indicates an end of paragraph and a branch is taken to EOP where control is returned back to BLDCRD.

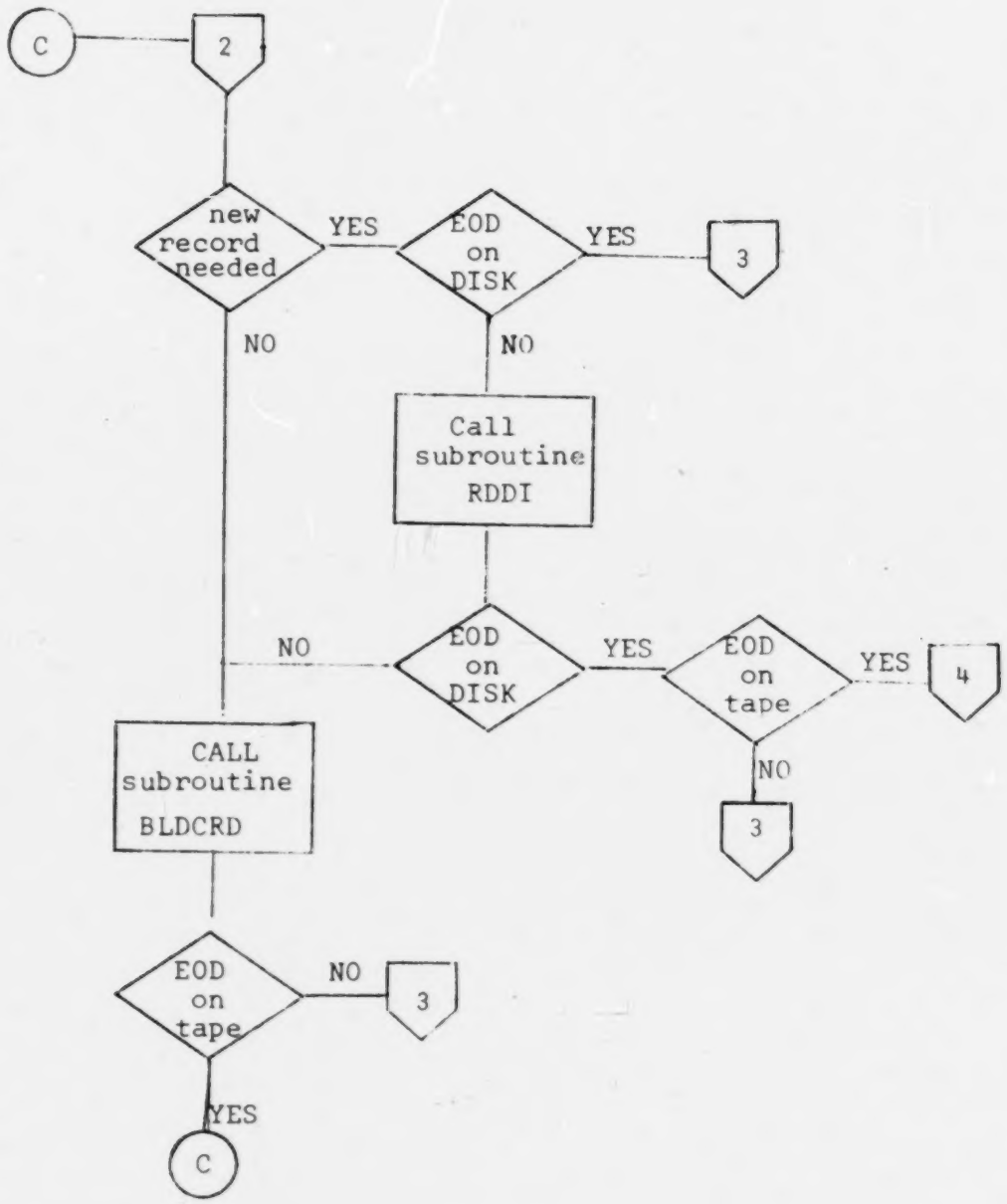
After one left and one right card have been built, the subroutine WRTA writes the line images to tape, blocking them before output. Also this subroutine places a control number on the first line image of the card image pair. This control number is used primarily in making production reruns. A carriage control character is developed for each line image. If either the left or right card image is a start of pack card then a line of lower case 'w's' is output before the start of pack card image. If sense switch 3 is turned 'ON', the routine WRLO is used to write the card images on the LO device. Control is returned normally back to BLDRT.

V. GENERAL INFORMATION FLOW

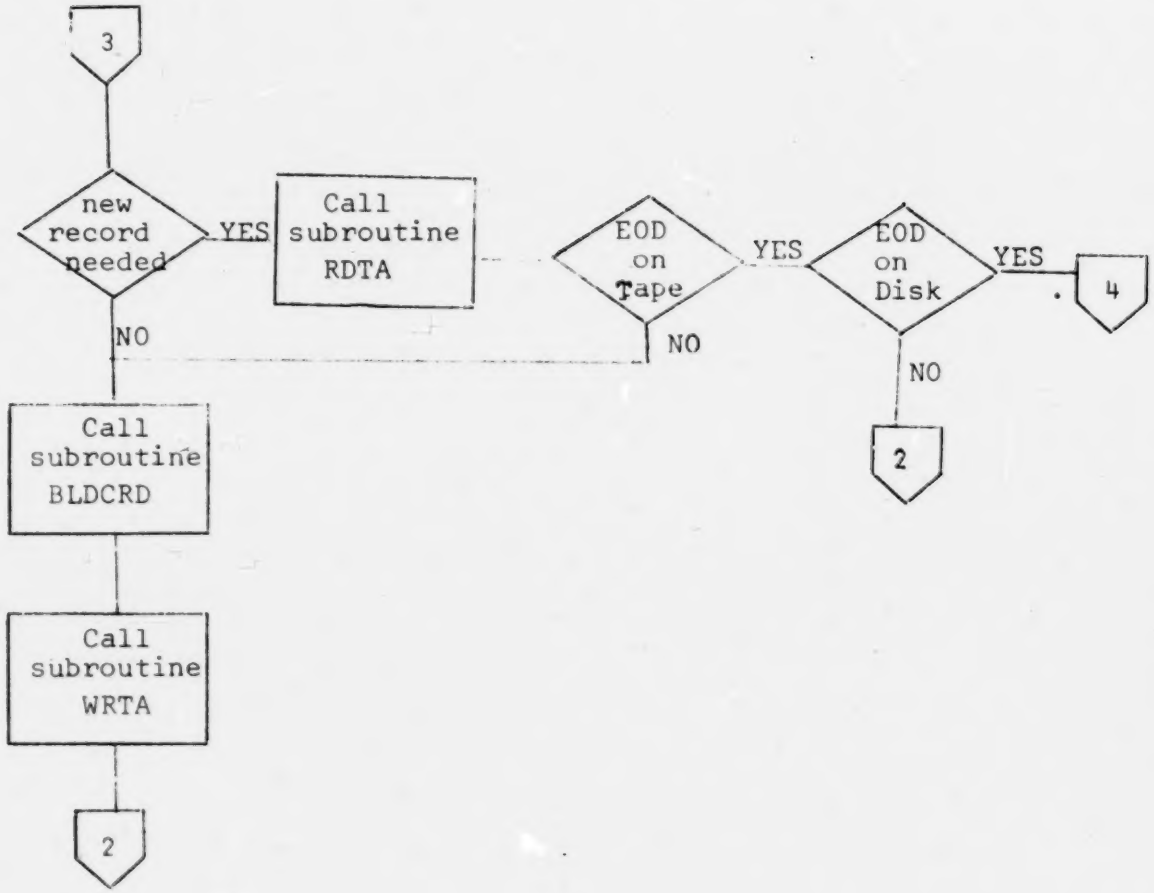




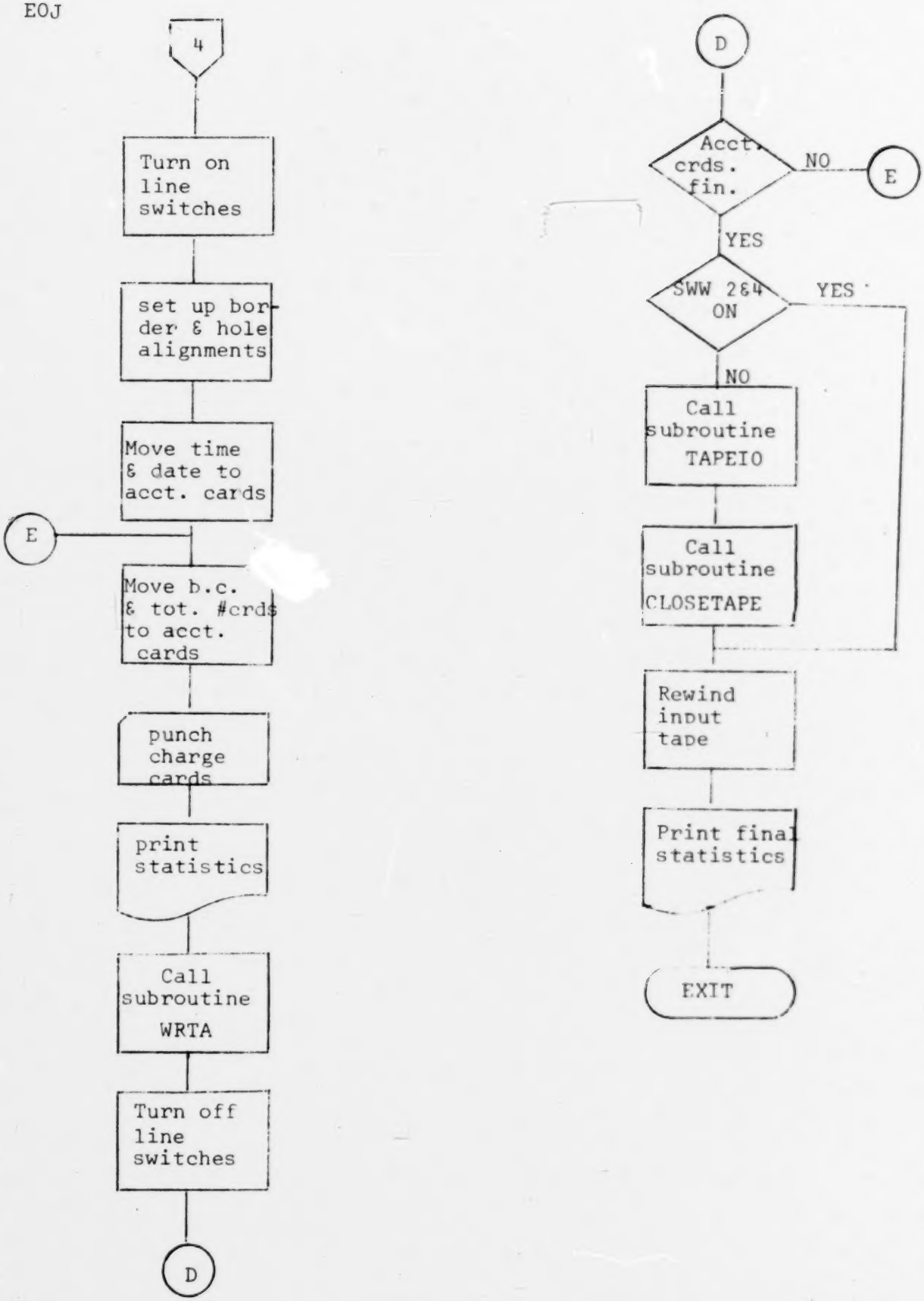
BLDLFT


C
2
new record needed
YES
EOD on DISK
YES
3
NO
NO
Call subroutine RDDI
NO
EOD on DISK
YES
EOD on tape
YES
4
NO
3
CALL subroutine BLDCRD
EOD on tape
NO
3
YES
C

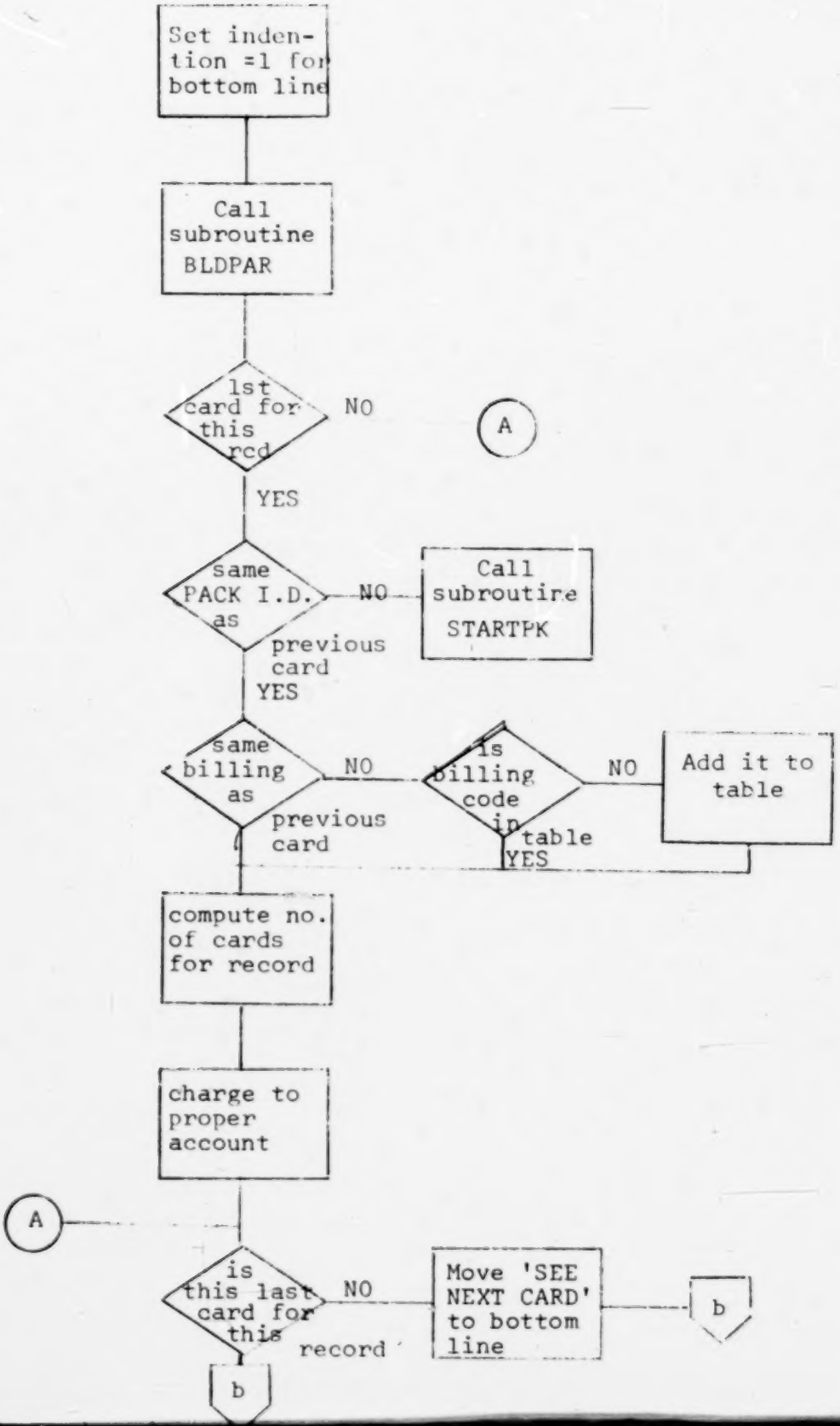
BLDRT


3
new record needed
YES
Call subroutine RDTA
EOD on Tape
YES
EOD on Disk
YES
4
NO
NO
NO
2
Call subroutine BLDCRD
Call subroutine WRTA
2

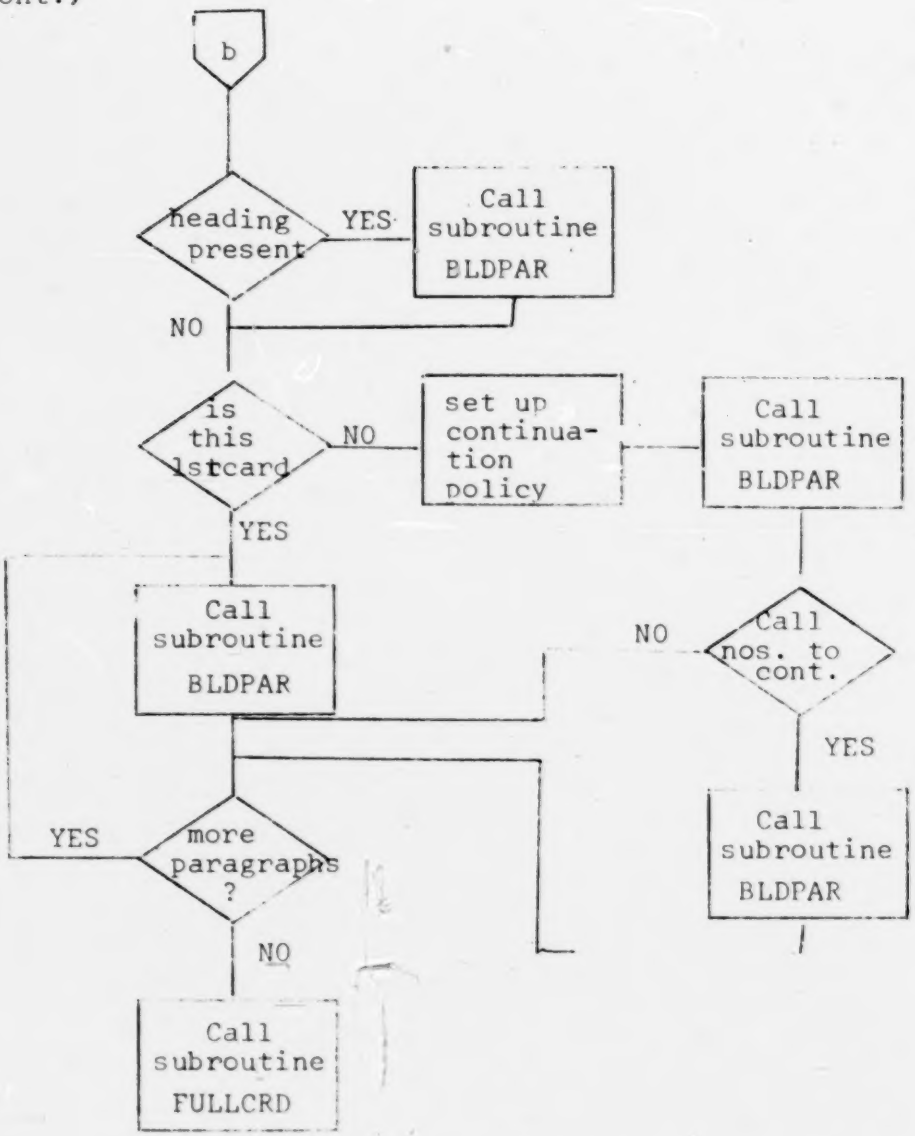
EOJ

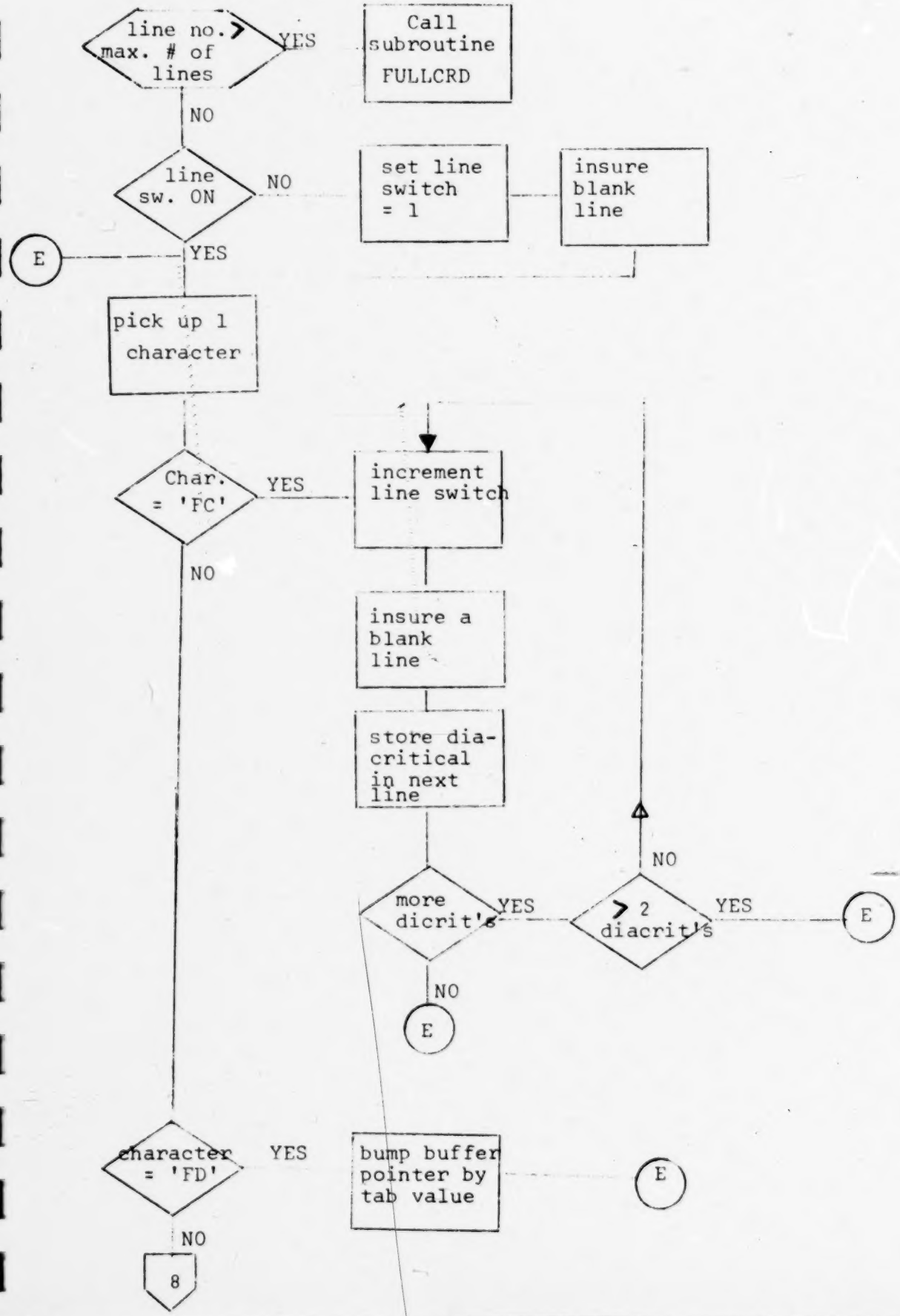

4
Turn on line switches
set up border & hole alignments
Move time & date to acct. cards
E
Move b.c. & tot. #crds to acct. cards
punch charge cards
print statistics
Call subroutine WRTA
Turn off line switches
D
D
Acct. crds. fin.
NO
E
YES
SWW 2&4 ON
YES
NO
Call subroutine TAPEIO
Call subroutine CLOSETAPE
Rewind input tape
Print final statistics
EXIT

BLDCRD

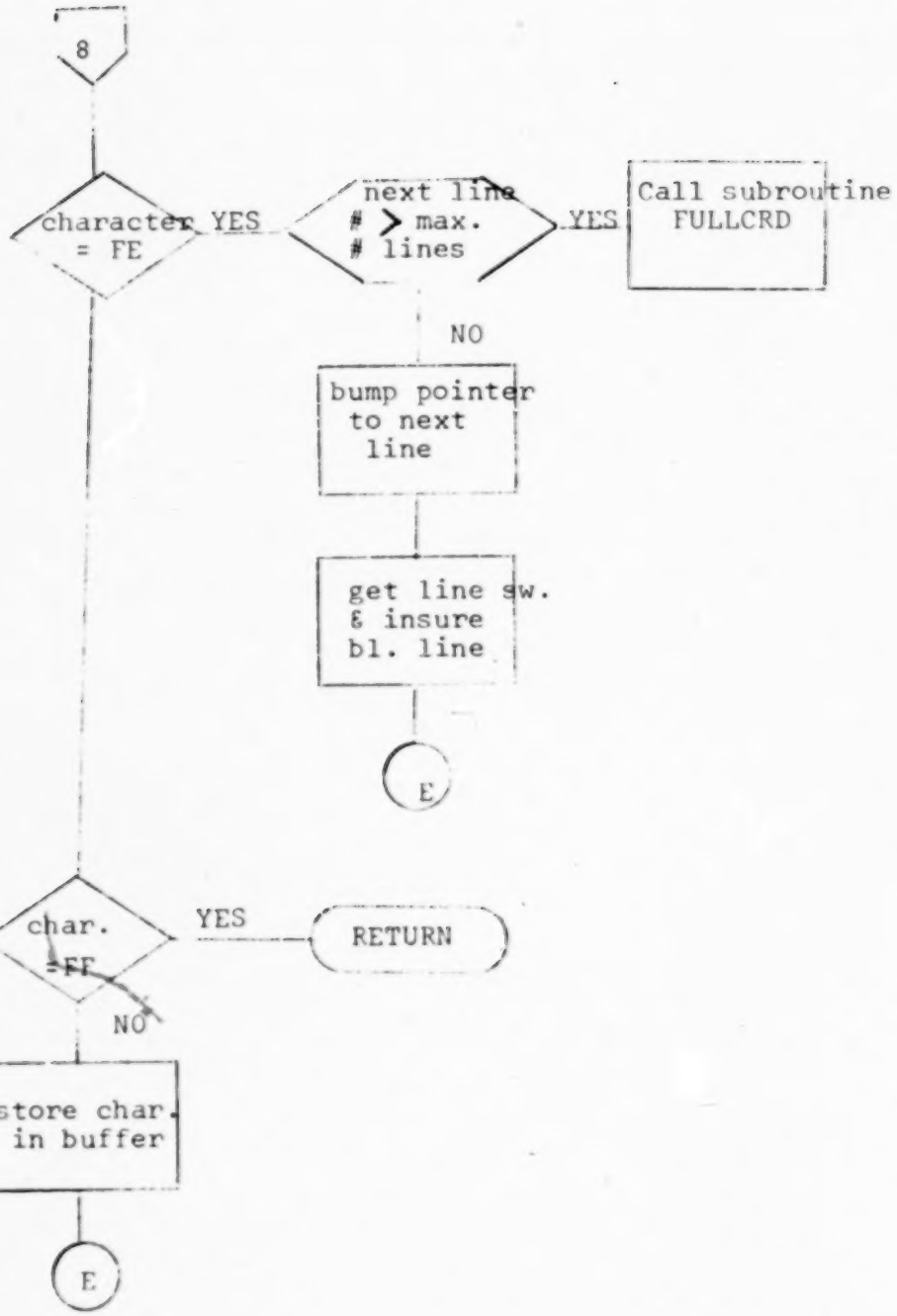

Set indention =1 for bottom line
Call subroutine BLDPAR
1st card for this rcd
NO
A
YES
same PACK I.D. as previous card
NO
Call subroutine STARTPK
YES
same billing as previous card
NO
is billing code in table
NO
Add it to table
YES
compute no. of cards for record
charge to proper account
A
is this last card for this record
NO
Move 'SEE NEXT CARD' to bottom line
b
b

BLDCRD
(cont.)

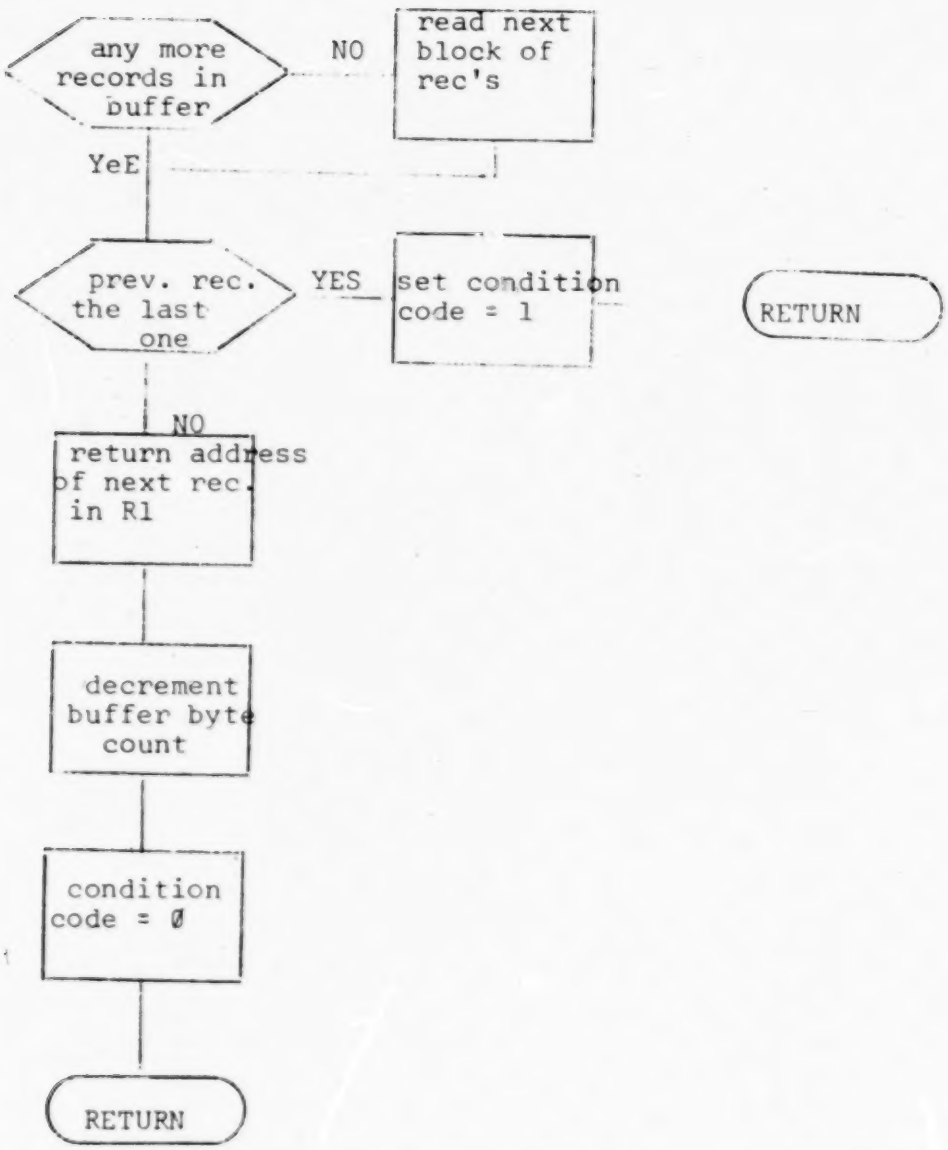

b
heading present
YES
Call subroutine BLDPAR
NO
is this 1st card
NO
set up continuation policy
Call subroutine BLDPAR
YES
Call subroutine BLDPAR
NO
Call nos. to cont.
YES
Call subroutine BLDPAR
YES
more paragraphs ?
NO
Call subroutine FULLCRD


line no. > max. # of lines
YES
Call subroutine FULLCRD
NO
line sw. ON
NO
set line switch = 1
insure blank line
E
YES
pick up 1 character
Char. = 'FC'
YES
increment line switch
NO
insure a blank line
store dia-critical in next line
more dicrit's
YES
> 2 diacrit's
YES
E
NO
NO
E
character = 'FD'
YES
bump buffer pointer by tab value
E
NO
8

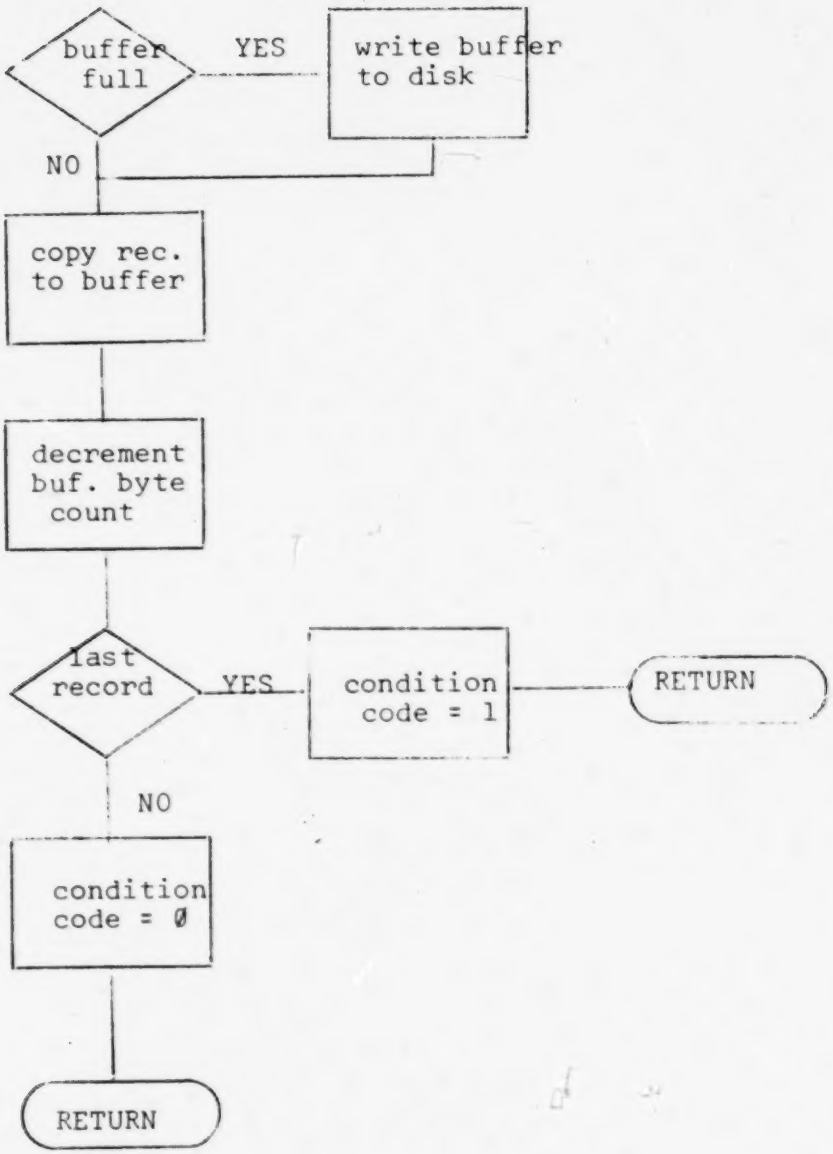
BLDPAR
(cont.)


8
character = FE
YES
next line # > max. # lines
YES
Call subroutine FULLCRD
NO
bump pointer to next line
get line sw. & insure bl. line
E
char. = FF
YES
RETURN
NO
store char. in buffer
E

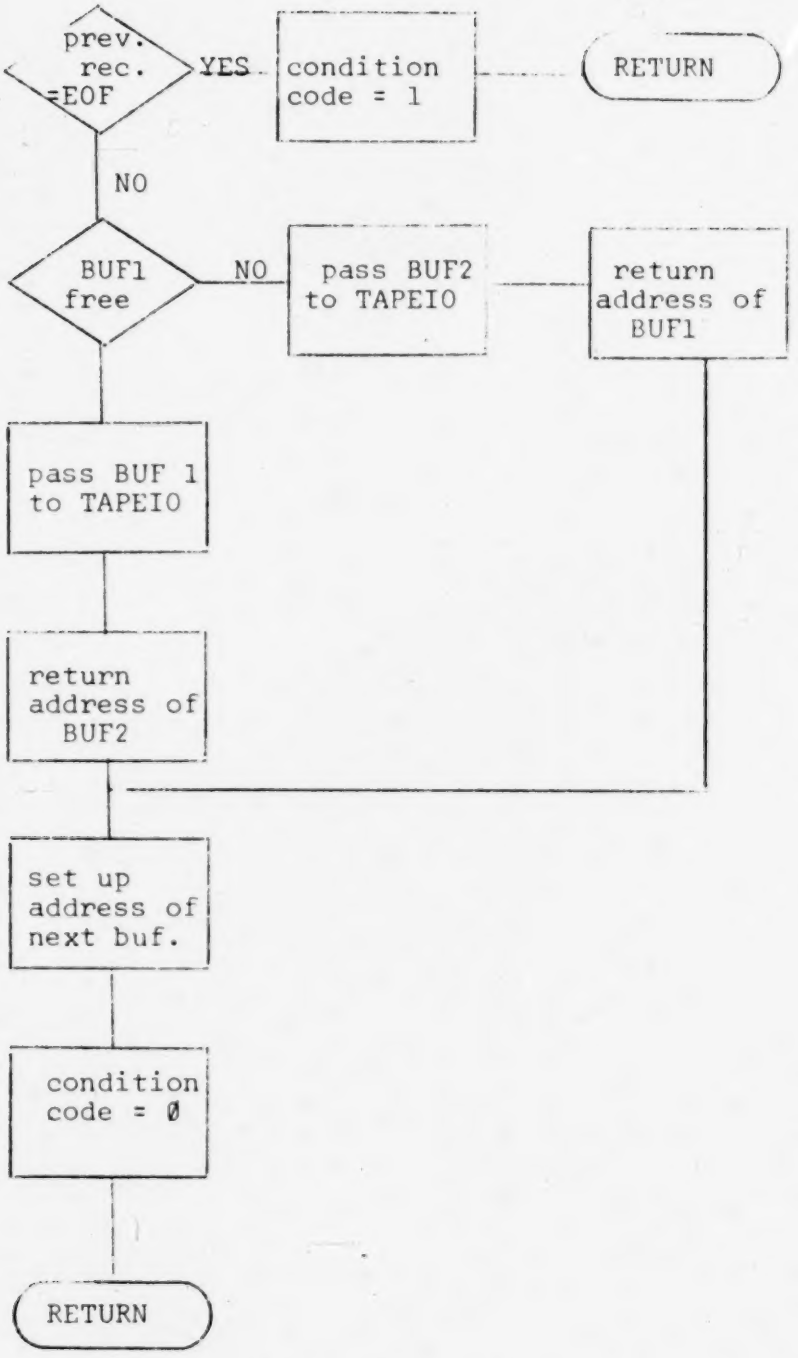
RDDI


any more records in buffer
NO
read next block of rec's
YeE
prev. rec. the last one
YES
set condition code = 1
RETURN
NO
return address of next rec. in R1
decrement buffer byte count
condition code = Ø
RETURN

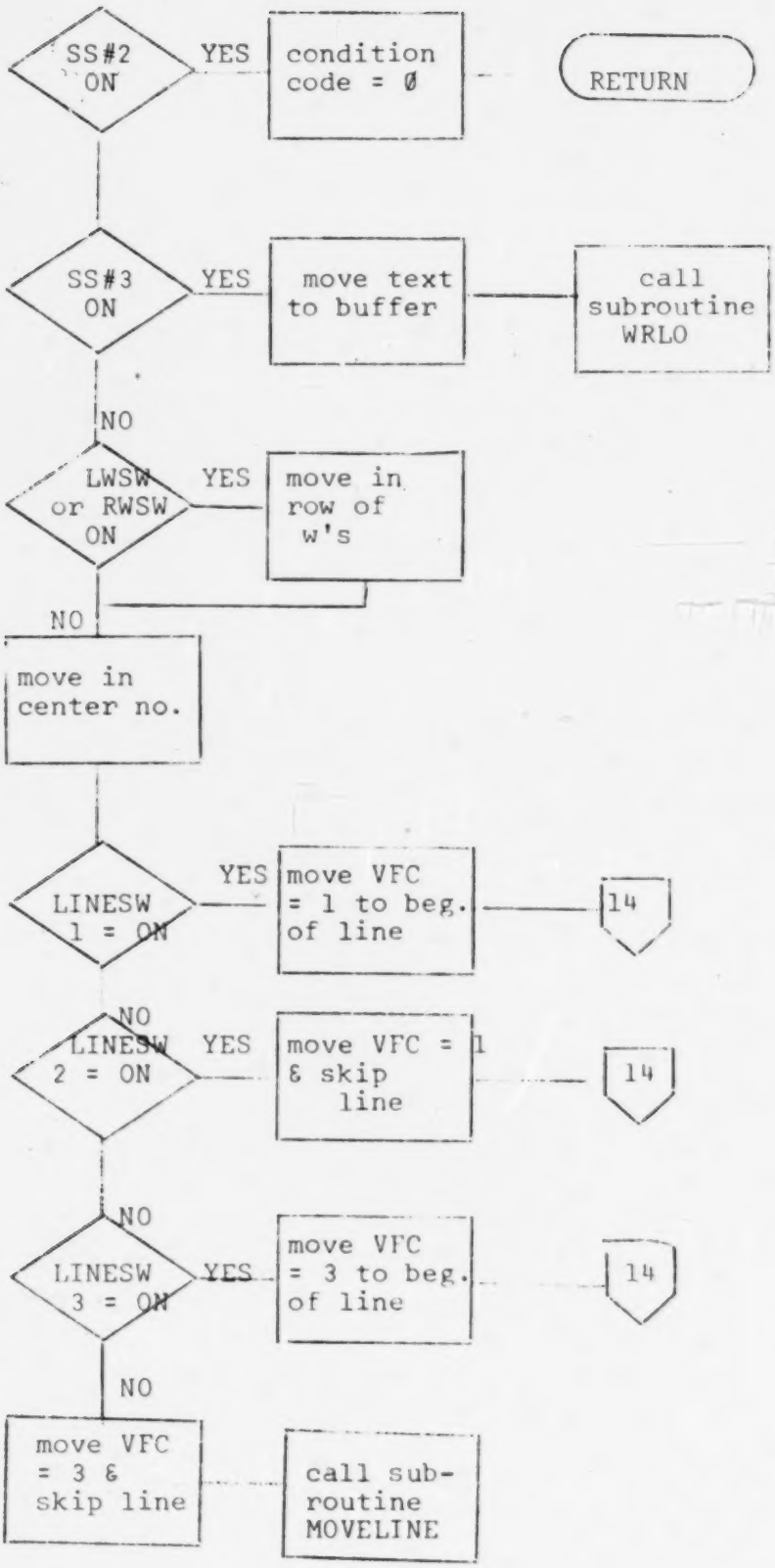
WRDI

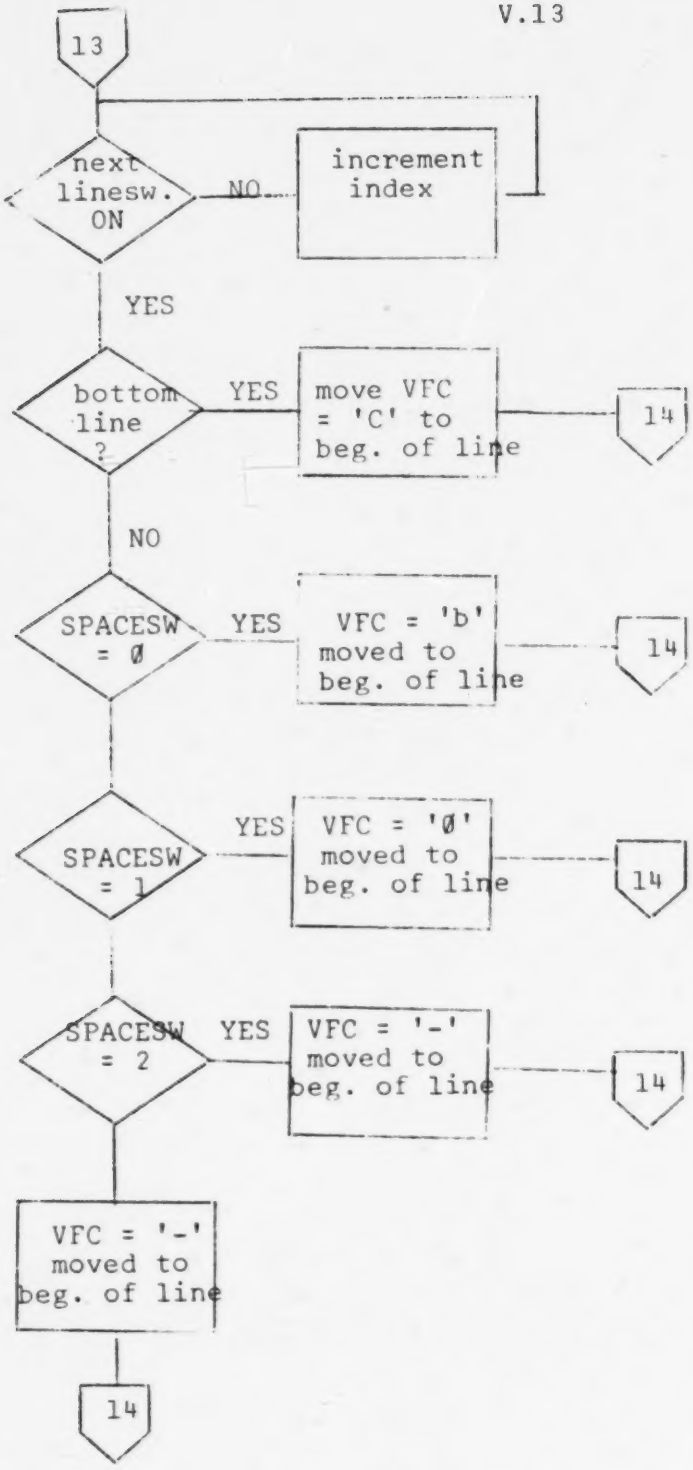

buffer full
YES
write buffer to disk
NO
copy rec. to buffer
decrement buf. byte count
last record
YES
condition code = 1
RETURN
NO
condition code = Ø
RETURN

RDTA

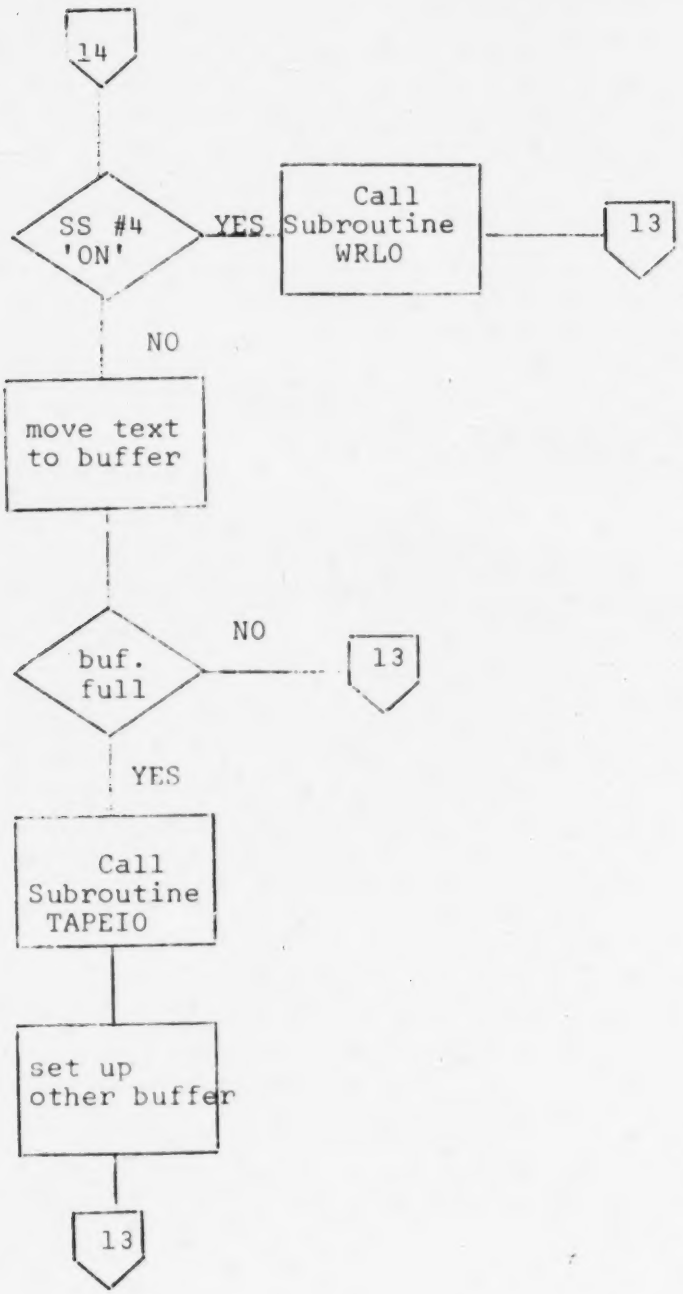

prev. rec. =EOF
YES
condition code = 1
RETURN
NO
BUF1 free
NO
pass BUF2 to TAPEIO
return address of BUF1
pass BUF 1 to TAPEIO
return address of BUF2
set up address of next buf.
condition code = Ø
RETURN

WRTA

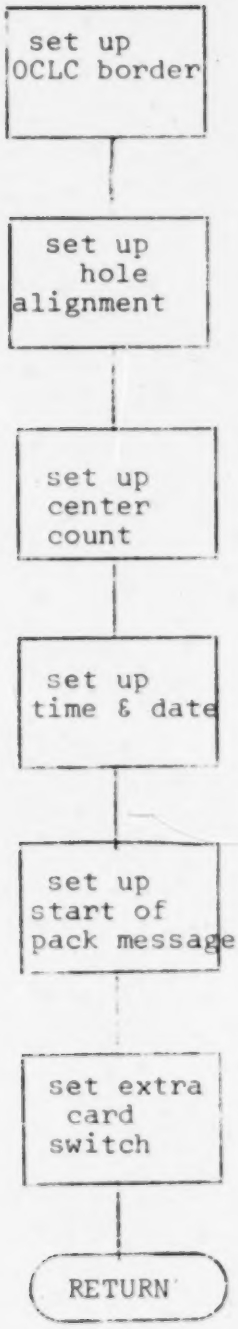

SS#2 ON
YES
condition code = Ø
RETURN
SS#3 ON
YES
move text to buffer
call subroutine WRLO
NO
LWSW or RWSW ON
YES
move in row of w's
NO
move in center no.
LINESW 1 = ON
YES
move VFC = 1 to beg. of line
14
NO
LINESW 2 = ON
YES
move VFC = 1 & skip line
14
NO
LINESW 3 = ON
YES
move VFC = 3 to beg. of line
14
NO
move VFC = 3 & skip line
call sub-routine MOVELINE


13
next linesw. ON
NO
increment index
YES
bottom line ?
YES
move VFC = 'C' to beg. of line
14
NO
SPACESW = Ø
YES
VFC = 'b' moved to beg. of line
14
SPACESW = 1
YES
VFC = 'Ø' moved to beg. of line
14
SPACESW = 2
YES
VFC = '-' moved to beg. of line
14
VFC = '-' moved to beg. of line
14

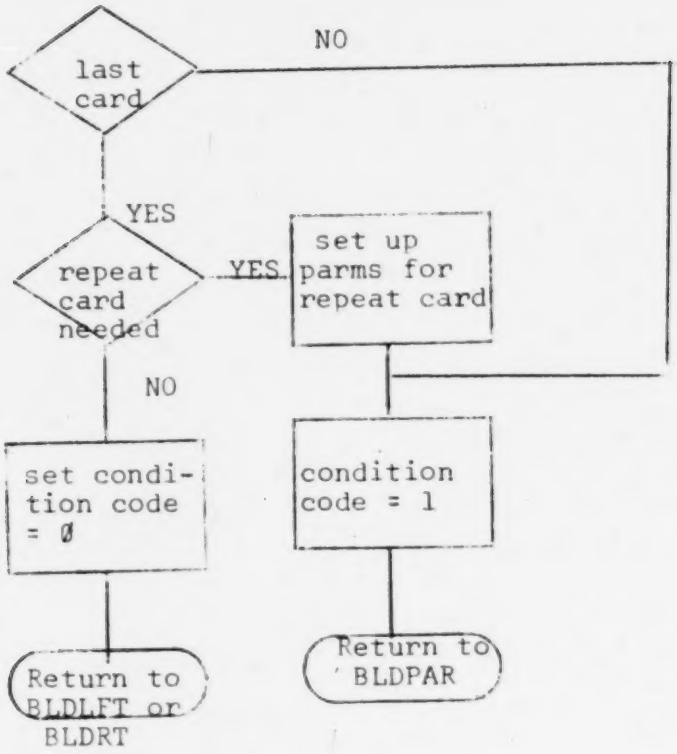
MOVELINE


14
SS #4 'ON'
YES
Call Subroutine WRLO
13
NO
move text to buffer
buf. full
NO
13
YES
Call Subroutine TAPEIO
set up other buffer
13

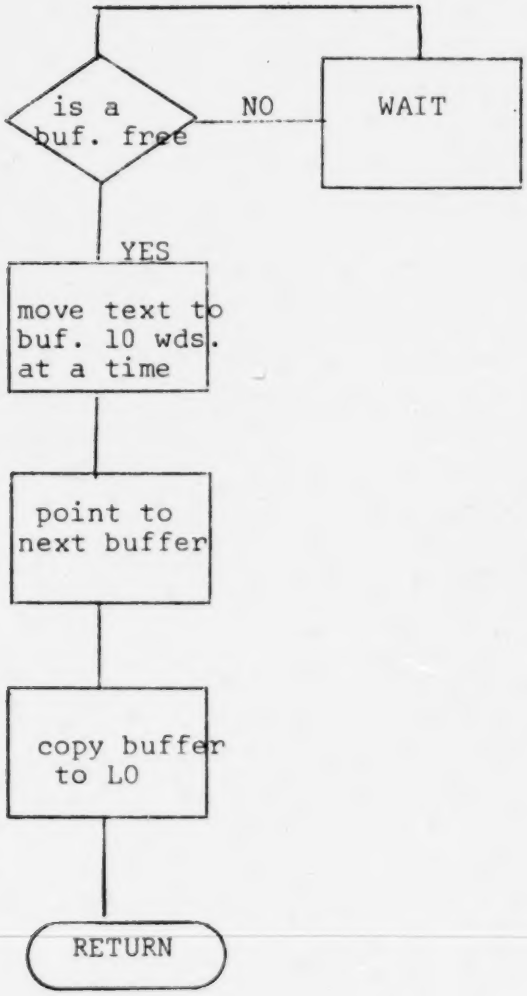
STARTPK


set up
OCLC border
set up
hole
alignment
set up
center
count
set up
time & date
set up
start of
pack message
set extra
card
switch
RETURN

FULLCRD


last card
NO
YES
repeat card needed
YES
set up parms for repeat card
NO
set condition code = Ø
condition code = 1
Return to BLDLFT or BLDRT
Return to BLDPAR

WRLO


is a buf. free
NO
WAIT
YES
move text to buf. 10 wds. at a time
point to next buffer
copy buffer to LO
RETURN

VI. SOFTWARE INTERFACE

A. Linkage - Background linkage with OBM.

B. Parameter List Description - none

C. Return Codes - none

D. Other Entry Points - none

E. OCLC Subroutines Referenced

TAPEIO
OPENTAPE
CLOSETAPE
LIBSCH
INSI TUT
MBS

VII DESCRIPTION OF SPECIAL STORAGE AREAS, SWITCHES AND TABLES

A. Special Storage

DEST - A 3,312 byte card image buffer. It allows for 48 characters across the card and 69 lines which accounts for two overprint lines for each of the 23 lines of text.

B. Special Switches

CNTRCNT - This switch is used to keep an internal count to be used for the center number. This switch is incremented by 1 every time one right and one left image are complete.

COUNT - This switch is used to keep an internal count of the number of cards for a particular record. When the record is finished, COUNT is reinitialized to '0'.

DEODSW - This switch is set to '1' when the end of data has been reached on disk. It is set to '0' at all times.

DICRTSW - This switch is used as a counter for the number of diacriticals associated with a character. Only two diacriticals are allowed.

FRSTCRD - When this switch is set to '0', the first card for this record is not finished. It is set to '1' when the card is finished.

EODSW - This switch is set to '1' when the last block of records has been read from disk.

LNSW - This switch is used to indicate whether or not a particular line of the card image buffer is to be printed. There are 23 line switches, one associated with each possible line of text. The four possible line switch values are:

Value	Indication
= 0	line is not to be printed
= 1	line is to be printed
= 2	line is to be printed and has 1 diacritical line associated with it
= 3	line is to be printed and has two diacritical lines associated with it

LRDSW - This is the left read switch. When it is set to '1', a new record is not needed because the previous record is not yet finished. When it is set to '0', the previous record is finished, and a new record is to be read from disk.

LWSW - This is the left 'W' switch. When it is set to '1', the card on the left is an account card or a pack divider card and is to have a row of W's printed across the top.

MIDSW - This switch is set to '1' if the last paragraph of this record ended in mid point and is to be completed before the next paragraph is started.

NFREE - This switch is used to indicate the number of output buffers that are free in the subroutine WRLO.

OPSW - This switch is used in three subroutines to indicate whether or not the device is open and to keep an internal count of the transactions on that device. It is used in WRDI to test the disk, in WRLO to test the LO device, and in RDTA to test the tape. If OPSW is greater than '0', the device is open.

RPTS - This switch is used to keep an internal count of the number of repeat records that have been processed.

RTRDSW - This is the right read switch. When it is set to '1' a new record is not needed because the previous record is not yet finished. When it is set to '0', the previous record is finished and a new record is to be read from tape.

RWSW - This is the right 'W' switch. When it is set to '1', the card on the right is an account card or a pack divider card and is to have a row of W's printed across the top.

SPACESW - This switch is used to keep a count of the number of lines to skip between lines of text. For each line switch that is turned 'OFF', SPACESW is incremented by 1. If SPACESW is greater than 3 when a line switch is found 'ON', a fake triple space is required. After a line is moved to the output buffer, SPACESW is re-initialized to '0'.

TAPEOPEN - This switch is set to '0' if the previous write to tape is complete and the tape is free. This is set in the subroutine WRTA.

TEODSW - This switch is set to '1' when the end of data is reached on tape. It is set to '0' at all other times.

TXTSW - This switch is turned 'ON' when a line of text is passed to BLDPAR. TXTSW is turned 'OFF' for the bottom line, the pack I.D. cards and the heading paragraph.

WSW - This switch is set in the subroutine STARTPK to indicate to the main-line program that a row of 'w's' are to be printed across the top of the current image.

#BLKS - This switch is used to keep an internal count of the number of blocks written to disk.

#EXTRACR - This switch is used to keep an internal count of the number of extra cards for the entire run. An extra card is considered an account card or a pack I.D. card.

C. Special Tables

MONTBL - This is a table of valid three-letter codes for the months of the year. This table is used to verify the operators time and date key-in. If the month entered on the console is not in this table, the operator is requested to input the information again.

ACCTAB - This is a 128 word table which contains 256 half-word entries. Each entry corresponds to a particular billing code. The total number of cards produced for an institution is charged to its appropriate entry in ACCTAB.

ERRTBL - This is a table of error messages. Each message has a two-word entry in this table. The first word is the address of the message and the second word is the length in words of the message.

APPENDIX A

OPERATING REQUIREMENTS

1. Computer - Xerox Sigma 5
2. I/O Devices - Two 9 track tape drives, line printer, card reader/punch
3. Operating System - OBM
4. Execution Time - depends on number of input records, approximately
5. Run schedule - daily
6. Job Control Language

```
!JOB ONLINE, BUILDPT
!IMG002A  F2
!PAU  DISMOUNT 1st SCRATCH TAPE FROM T1 & MOUNT
 LABELED PRINT TAPE, RING IN
!IMG002A  E1
!PMD
!BPT
!MES DISMOUNT TAPE FROM T1, PULL RING, SUBMIT TO LRCC
!STD  (C,D6,ADDHOLDS)
```

APPENDIX B

OPERATING CHARACTERISTICS

1. Console Messages

!!PAU - DISMOUNT 1st SCRATCH FROM T1 & MOUNT
LABELED PRINT TAPE, RING IN

RESPONSE: Mount tape as directed

'ENTER OUTPUT TAPE VOL SER NO.'

RESPONSE: enter the number requested

'IS TODAYS TIME/DATE CORRECT FOR THIS RUN,
YES - ENTER 'C', NO - ENTER 'HH:MM MON DD,'YY'

RESPONSE: a) 'C'
b) enter time and date
example: '12:30 12 13,'72'

!!MES - DISMOUNT TAPEFROM T1, PULL RING,
SUBMIT TO LRCC

RESPONSE; none

!!PAU -- DISMOUNT 2nd SCRATCH TAPE FROM T0

RESPONSE: Dismount tape as directed

2. Programmed Abnormal Completion

BPT will terminate abnormally via a CAL1,9 1 (EXIT) Under the following conditions. The message printed out and reason are included in each case.

MESSAGE	REASON
E1 - UNABLE TO LOCATE MID POINT	Two possible reasons: 1) one record cannot have more than 99 continuation cards. 2) an end of file was encountered on the input tape before half of the records were spooled to disk.
E2 - UNUSED OPTION CODE	Unused at moment.
E3 - CHARCTER OVERLAY IN CARD IMAGE	The character in the card image must be a blank before the text character is moved in.

3. Diagnostics - none

4. Parameter Cards Required - none

5. Example of Output - next page

the ohio college library center
1314 kinnear rd. - columbus ohio - 43212

Record Layout

File Name BPT PUNCHED OUTPUT

Record Name BILLING INFORMATION

Record Type - (X) Card ( ) Tape ( ) Disk ( ) Other _____

File Organization SEQUENTIAL Record Size 80 Block Size UNBLOCKED

General Description A card entry of 15 bytes is punched for each institution producing cards.

FIELD NAME AND DESCRIPTION	FIELD POSITION	FIELD LENGTH	FORMAT
Billing Code	1-3	3	ALPHA
Transaction Code '2'	4	1	ALPHA-NUMERIC
Date of Charge	5-10	6	ALPHA-NUMERIC
# of cards charged	11-15	5	ALPHA-NUMERIC

APPENDIX C

DETAILED DESCRIPTION OF INTERNAL SUBROUTINES

SUBROUTINE	PAGE
BLDCRD	VIII.5
BLDPAR	VIII.9
BLNKLINE	VIII.8
BORDER	VIII.10
CVD	VIII.6
DICRT	VIII.9
EOL	VIII.8
EOP	VIII.8
FULLCRD	VIII.9
MOVELINE	VIII.8
RDDI	VIII.6
RDTA	VIII.7
SRCHBIL	VIII.6
STARTPK	VIII.10
TAB	VIII.8
WRDI	VIII.6
WRLO	VIII.10
WRTA	VIII.7

BLDCRD

This routine is used to build the card image and move it to the card image buffer. The bottom line for the card is built first. This is accomplished by setting up the zero indentation for the bottom line, setting up the number of lines per card, and issuing a branch and link instruction to BLDPAR.

On the first card for each record, the pack I.D. and the billing code are checked. If the current pack I.D. does not match that of the previous record, a branch is issued to the subroutine STARTPK to insert a new pack divider card. If the billing code does not equal that of the previous record, a branch and link is issued to the subroutine SRCHBIL to locate the new billing code. The number of cards for this record is then computed and billed accordingly.

If more than one card is required the message 'SEE NEXT CARD' is moved to the bottom line. The card number is also moved into the line below the heading.

Each paragraph of text is then processed in turn by issuing a branch and link to the subroutine BLDPAR. After the last line has been processed, a branch is issued to FULLCRD.

The linkage register is R7. The condition code is set to 0 if the record is complete. If the record is not complete, the condition code is set to 1 to prohibit another read. Registers 2 - 8 are used.

CVD This routine is used to convert numeric byte stings to their decimal equivalent. The field to be converted is passed in R8 and the result is left in the three word buffer pointed to by R9. The buffer contains the converted number with leading blanks. The linkage register is R7. Registers 0-3 and 7,8, and 9 are used. None of the registers are destroyed.

SRCHBIL This routine is used to search for the billing code in the institutuion table called INSTITUT located on the pub-lib. The billing code is passed in R8. BPT assigns a key to each institution code in the table INSTITUT. BPT then alphabetically sorts these keys. SRCHBIL performs a binary search on INSTITUT using these sort keys as an index.

If the billing code is not in INSTITUT, the added entry table is searched. If the code is not in this table either, it is added at the end of the second table. If there are already five added entried in the second table, no more codes are added, the cards are not billed, and an error message is printed. In either case, a warning message is printed declaring that the billing code is not in the INSTITUT table.

The condition code is set to '1' if the cards were not billed, otherwise the condition code is 0. The linkage register is R7. Registers 2,3,7,8, and 9 are used. R2 and R3 are destroyed.

WRDI This routine isused to write the first half of the input records onto disk and block the reocrds to track size (6144 bytes). Upon entry, R1 has the word address of the buffer where the record is after being read from the input tape (RDTA). WRDI moves the record to a buffer that has a maximum size of 6144 bytes. The residual byte count is adjusted, the buffer address for the next move is set up and control returns with a condition code of '0'. Upon subsequent entries to WRDI, if the entire new record will not fit in the remaining area of the buffer, a CAL3,0 is issued to write the contents of the entire buffer on disk. Then this new record is moved to the cleared buffer. After the last record has been written, the open switch, OPSW, is turned off and control is returned with a condition code of '1'.

The linkage register is R7. R1 enters with the word address of the buffer. Registers 1-5, 7, and 8 are used. All are destroyed except R1 and R7.

RDDI This routine is used to read the first half of the input records that were spooled off onto disk. RDDI first checks to see if there are any more records in the output buffer. If not, the routine RDTRK will issue a CAL,3,0 and read one entire block of records into the buffer which is 6144 bytes. RDDI then returns the word address of the next record in R1. The byte

count of the buffer is decrement, the condition code is normally set to 0 and control is returned. If the previous record was the last one, the condition code is set to 1.

The linking register is R1. The word address of the record is returned in R1. Registers 1,2,3,7, and 8 are used. R8 is destroyed.

RDTA

This routine is used to read the input records (CCFP output records) from tape. The I/O is accomplished using two swing buffers so that main line processing can continue. Upon entry to RDTA, the free buffer is found. A branch and link is issued to the external subroutine TAPEIO where the read is initiated using this free buffer. The address of the other buffer is returned in R1. This buffer contains the record from the previous read. The condition code is normally set to 0 and control is returned. On end of file, the condition code is set to 1.

The linkage register is R7. Registers 1,4,6,7,8,10 and 11 are used. The address of the record is returned in R1. All other registers are destroyed except R6 and R7.

WRTA

This routine is used to write the formatted card images on the output tape. If sense switch 2 is 'ON', no output is required and control is returned with condition code = 0. If sense switch 3 is 'ON', output goes to the line printer and a branch is taken to WRIA2LP.

If all sense switches are 'OFF', the 'W' switches (LWSW and RWSW) are tested. If either switch =1, a row of 'W's' is moved to the top of the card. Normally, the switch will be turned on only for pack divider cards and account cards.

The routine CN is used to move in the center number.

The first three line switches are then tested to locate the first line of text. If line switch 1 is 'ON', the vertical format character '1' (skip to Channel 1 -- top of card) is moved into the first byte of the line. If line switch 2 is 'ON', a skip to Channel 1 character is moved into the first byte and a blank line is then moved in. This effictively starts printing on line 2. If line switch 3 is 'ON', the vertical format character '3' (skip to Channel 3 -- 3rd line of card image) is moved into the first byte. If all three line switches are 'OFF', the next text line begins with the fake to Channel 4. A branch and link is then issued to MOVELINE.

All the other line switches are then tested in turn. When one is found 'ON', tje spacing switch is tested (SPACESW). If SPACESW =0, a blank is moved into the first byte to indicate single spacing. If SPACESW =1, a zero is moved into the first byte to indicate double spacing. If SPACESW =2, a dash is

moved into the first byte to indicate triple spacing. If more than three spaces are required, a triple space charcter is used instead. When the bottom line is found, the control character is a 'C' (skip to Channel 12 -- bottom line of card image). After the control character has been moved, a branch and link is issued to MOVE1INE.

At WRTA2LP, the text line is moved to a buffer. The address of the buffer is in R8 and the number of characters to write is in R9. A branch and link is issued to WRLO.

The linkage register is R7. All registers are used except R1 and R2. None of the registers are destroyed.

MOVELINE — This routine moves a line of text, after the vertical format control character has been inserted, to one of two output buffers. When the buffer is full (1800 words), a branch and link is issued to TAPEIO to write the contents of the buffer tape.

If sense switch 4 is 'ON', a branch is taken to PRISETUP. From here, a branch and link is issued to WRLO to write thirty words on the LO device.

The linkage register is R7. Registers 1-12 are used. None of the registers are destroyed.

BLNKLINE — This routine is used to assure that a line image is blank before moving in the text. Twelve words of blanks are moved into both the left and right record buffers. The linkage register is R7. Registers 5,7,8, and 9 are used. R5 is destroyed.

EOP — This routine is used whenever a X'FF' is found in a text paragraph. This indicates that the end of the paragraph has been reached. The condition code is set to 0 and control returns back to BLDCRD. The linkage register is R7.

TAB — This routine is used whenever a X'FD' is found in a text paragraph. This indicates that the value following the X'FD' is to be used as a tab value. The pointer to the output buffer is to be incremented by this value. Control is returned back to LOOP3.

EOL — This routine is used when a X'FE' is encountered within a text paragraph. This is to indicate an end of line and the pointer to the output buffer is bumped to the next line. The line switch for this new line is turned 'ON' and a branch and link is issued to BLNKLINE. Control is returned back to BLDPAR.

If the next line will be the last line of text on the card (not the bottom line), the condition code is set to 1 and control is returned back to BLDCRD.

DICRT This routine is used when a X'FC' is encountered within a text paragraph. This indicates that the next character is a diacritical and is to be placed in the overprint line. The current line switch is incremented by 1 to indicate the presence of the diacritical and the diacritical switch, DICRTSW, is incremented by 1. If there is another diacritical following this one, the line switch and the diacritical switch are incremented by 2. Any more diacriticals for this character are ignored. The diacritical is then moved to the card image buffer in the overprint line. The diacritical switch is returned back to BLDPAR.

BLDPAR This is a subroutine used by BLDCRD in which one paragraph is built and moved to a buffer. Upon entry, R2 must have the byte address of the current paragraph.

First the mid paragraph switch, MIDSW, is tested. If it is 'ON', the last paragraph ended in mid point and it is to be finished. Otherwise, the second byte of the paragraph is tested. The first byte of the paragraph is the line number. If the second byte is a X'FF', this indicates that the call number follows. The zero indention for the call number is set up and processing continues.

If this line number is greater than 23, a branch is taken to FULLCARD.

Next the line switch on the card image buffer is tested to be sure that it is turned 'ON'. Each character is then tested and moved to the card image buffer in succession. If the character is X'FA' or X'FB', an error message is printed and a CALl,9 1 (EXIT) is issued. If the character is a X'FC', a branch is taken to DICRT. If the character is a X'FD', a branch is taken to TAB. If the character is a X'FE', a branch is taken to EOL. If the character is a X'FF', a branch is taken to EOP, where control returns to BLDCRD.

The linkage register is R7. Registers 2-9 are used. At exit, R2 is the byte address of the last byte processed. All other registers are destroyed.

FULLCRD This routine is used to set up the parms if this record is to be repeated, set the condition codes, and return. If the record is complete, the count of cards for this record and the number repeats are cleared. The condition code is set to 0 and control is returned back to BLDLFT or BLDRT. If the record is not complete, the condition code is set to 1 and control is returned back to BLDCRD. The address of the last byte processed (R2), is saved at location TEXT.

Registers 2,3,4, and 7 are used.

BORDER This routine is used to set up the OCLC border and hole alignment on the pack divider cards and the account cards. If all the line switches are not turned on, they are set for the initial print. For each line where the switch was not on, the routine BLNKLINE insures that the line is initially all blank. The characters 'OCLC' are then repeatedly moved into the top and bottom lines and down each side. Six character '0's are used to indicate the proper hole alignment.

Linkage to this routine is through R7. Register 3 through register 8 are used and R8 is destroyed.

STARTPK This subroutine is used to set up the start of pack cards. A branch and link is initiated to the subroutine BORDER. STARTPK picks up the pack identification from the location PACKIDX and moves it to the card image location. The address of the card image location is passed in DEST. The center count number is picked up from CNTRCNT. A branch and link is initiated to the subroutine CVD to convert the center count number to decimal format and move it to the card image. The time and date for this run are picked up from TIME and moved to the card image. The message 'START OF PACK' is then moved. The switch WSW is set to inidcate that a line of W's are to be printed across the card. A branch is taken to NOTDONE to indicate that the previously read record has not been processed. Registers 1-9 are used and all are destroyed.

WRLO This subroutine is used to write the card images one line at a time to the M:LO device. This routine expects the word address of the text line to be in R8 and the number of words to be written to be in R9. Nothing is written if the value in R9 is less than 0 or greater than 33.

The switch NFREE is used to indicate the availability of one or both of the buffers. If neither of the buffers are ready, a branch and link is initiated to TLO where a CAL1,1 is issued to wait for the I/O. When a buffer is found free, the text is moved 10 words at a time. NXTIN is then set with the address of the next available buffer and NFREE is decremented by 1. A branch and link is then initiated to TLO. R7 is used as the linkage register.

At TLO, a CAL1,1 is initiated to check the status of the I/O. If the LO device is busy, the condition code is set to 1 and control is returned back to the calling routine. A CAL1,1 is issued to write the text line to the LO device. NXTOUT is then set with the address of the next available buffer and NFREE is incremented by 1. Control is returned to WRLO through R7.

Register 4 and registers 6-10 are used and all except R7 are destroyed. The linkage register is R7.

APPENDIX D

ADDITIONAL SUBROUTINE DOCUMENTATION

FUNCTIONS

TAPEIO is a general purpose input/output subroutine which performs the following functions depending on a function code passed from the calling program.

FUNCTION CODE	FUNCTION
X'00'	READ
01	WRITE
02	READ REVERSE
03	WEOF
04	SKIP ONE RECORD FORWARD
05	SKIP ONE RECORD BACKWARD
06	SKIP ONE FILE FORWARD
07	SKIP ONE FILE BACKWARD
08	REWIND (ONLINE)
09	UNLOAD

TAPEIO sets up the FPT to be used in IOEX CAL2 from parameters passed by the calling program. If the function required does not involve data transfer (in the range of codes 3-9), the only parameters needed by TAPEIO are the function code, the unit address, and an event word. If data transfer is to be performed (codes 0,1,2), TAPEIO must also have the address of a buffer and the length of the data to be read or written. Upon entry to TAPEIO, general register 1 should be pointing to a user-defined work area on a double word boundary.

If the function to be performed involves data transfer or is a WEOF, two function parameter tables (FPT's) are set up. The first FPT is for the operation requested; the second is used to sense the device status in the event the requested operation does not end normally. For non-data transfer functions, only one FPT is constructed.

TAPEIO contains its own end action routine, STDEA. STDEA uses the Test Device (TDV) status returned by the IOEX CAL2 to determine the end action required. If the I/O operation terminated normally, the first byte of the event word in the first FPT is set to X'80' and control is returned. If the operation ended abnormally, the TDV status is interrogated more closely to determine the exact result of the operation.

A table of TDV status values and their meanings follows:

TDV STATUS	EXPLANATION
0200	NORMAL TERMINATION BEYOND END OF TAPE
0400	NORMAL TERMINATION AT BEGINNING OF TAPE
B87E	NORMAL TERMINATION
000E	IOP ERROR
0010	MEMORY ADDRESS ERROR
2000	WRITE PROTECT VIOLATION
1000	END OF FILE
8000	DATA OVERRUN
0800	NON-CORRECTABLE READ ERROR
0040	TRANSMISSION DATA ERROR
0020	TRANSMISSION MEMORY ERROR

A TDV status of 'B87E' initiates the return of a normal completion code (X'80') to the user. If the status is '1000', an end of file indication is returned. If the TDV status is '000E', '0010', or '2000', the error is not attributed to the I/O device; and no retry is attempted. If the status is one of the last four in the table, the retry count is interrogated. The retry count is arbitrarily set in TAPEIO to ten for data transfer operations (function codes 0-2) and WEOF (code 3) and is set to zero for non-data operations (codes 4-9). If the retry count for this operation is zero, an abnormal return code is posted, and control is returned to the calling program. If the retry count is greater than zero, retry procedures are initiated based on the type of I/O function that was attempted.

If the status is '0200' or '0400', a code is returned to indicate the position of the tape.

If the operation was a READ and the error is correctable (TDV status of '8000', '0040', or '0020'), the second FPT is pulled from the work area and used to sense the device. If the sense does not take, an unconditional backspace and retry are initiated; otherwise STDEA will alternately backspace, or forward space (depending on whether the READ was forward or reverse), sense, retry, and sense until either the retry count is zero or the I/O operation has been performed. If the retry count reaches zero before the operation has been terminated normally, the condition code returned is the result of the last retry.

If the operation was a READ but the error was declared non-correctable (TDV status '0800'), STDEA initiates an unconditional retry. It backspaces, or forward spaces if the operation was READ REVERSE, and attempts to READ again. The TDV status is interrogated after each retry of the READ. If the error status becomes correctable before the retry count is zero, STDEA will initiate sensing of the device and the correctable READ error procedure. In any case, retry continues until the operation is completed normally or the retry count reaches zero. If the retry count becomes zero before the operation has terminated normally the condition code returned is the result of the last retry.

If the operation was a WRITE or WEOF, STDEA automatically backspaces, senses, and attempts the operation again. This procedure continues until the I/O is complete or the retry count is zero. If the retry count reaches zero before the operation has been terminated normally, the condition code returned is the result of the last retry.

At its alternate entry point, TAPEWAIT, TAPEIO checks for completion of an I/O operation performed by TAPEIO. If the event is not complete TAPEWAIT issues a CAL2,9 0 to wait for completion. When the event is posted complete, the status is interrogated. If the completion is normal (X'80'), control is returned to the return address plus one. If the completion is abnormal (X'C0') control is returned at the return address. In either case BYTE0 of the event word is returned in bits 24-31 of R8.

SOFTWARE INTERFACE

A. LINKAGE

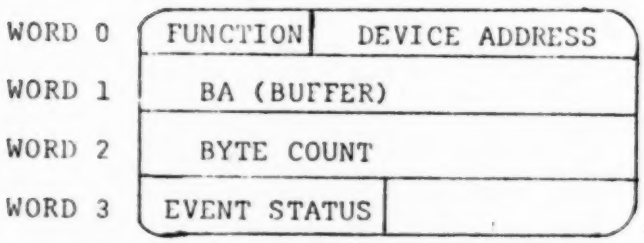
The calling sequence for TAPEIO is as follows:

```
LI,R1      WORKAREA
LI,R8      PARMS
BAL,R7     TAPEIO
```

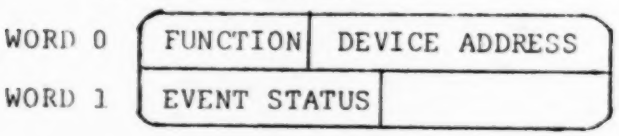
Where WORKAREA is a 16-word storage area aligned on a doubleword boundary.

B. PARAMETER LIST DESCRIPTION

For function codes 0, 1, 2



For functions 3-9



C. RETURN CODES

NORMAL COMPLETION: EVENTWORD BYTE 0 = X'80'
BYTE 1 = X'00'

ABNORMAL COMPLETION: EVENT WORD BYTE 0 = X'CO'
BYTE 1 = XX - CODE INDICATING NATURE OF ABNORMAL COMPLETION.

Possible event words for abnormal completion and their meanings are listed below:

EVENT WORD	TDV STATUS	MEANING
C001	0200	NORMAL TERMINATION BEYOND END OF TAPE MARKER
C002	0400	NORMAL TERMINATION AT BEGINNING OF TAPE
C00A	000E	IOP ERROR
C009	0010	MEMORY ADDRESS ERROR
C008	2000	WRITE PROTECT VIOLATION
C003	1000	END OF FILE
C007	8000	DATA OVERRUN
C004	0800	NON-CORRECTABLE READ ERROR
C005	0040	TRANSMISSION DATA ERROR
C006	0020	TRANSMISSION MEMORY ERROR
C000	----	UNIT UNRECOGNIZED
C00B	----	SOFTWARE ERROR

For codes C000-C003 and C008-C00B, no retry has been attempted. For codes C004-C007, retry has been attempted only if the function was a data transfer or WEOF.

D. OTHER ENTRY POINTS
TAPEWAIT

E. OCLC SUBROUTINES REFERENCED - none

F. OCLC PROCEDURES REFERENCED - none

SOFTWARE INTERFACE (TAPEWAIT)

A. LINKAGE

```
LI,R8      PARMS
BAL,R7     TAPEWAIT
```

B. PARAMETER LIST DESCRIPTION

same as for TAPEIO

C. RETURN CODES:

BYTE 0 of the user provided EVENT WORD is returned in bits 24-31 of R8

D. OTHER ENTRY POINTS - none

E. OCLC SUBROUTINES REFERENCED - none

F. OCLC PROCEDURES REFERENCED - none

PROGRAM: BPT
SUBROUTINE: LIBSCH

FUNCTIONS:

This subroutine contains the table of all holding libraries. Upon entry, R1 contains the three letter holding library code with a zero high byte. When this code is found in the table, the institution code and the cataloging library code are returned in R2.

SOFTWARE INTERFACE

A. Linkage

The calling sequence is:

```
LW,R1       PACKID          get lib code
SLS,R1       -8             insure zero in high byte
BAL,RØ      LIBSCH
```

B. Parameter List Description - none

C. Return Codes - none

D. Other Entry Points - none

E. OCLC Subroutines Referenced - none

F. OCLC Procedures Referenced

TCOM - This procedure generates a two-word entry for the library table. The first word contains the holding library code. The next half-word contains the institution code. The next half-word contains the cataloging library code.

PROGRAM: BPT
SUBROUTINE: INSTITUTIONS

FUNCTIONS:

The subroutine INSTITUTIONS contains the directory of all the institution codes. It also contains the text that appears on the screen as the cataloging source.

The string control word (SCW) is passed back. SCW is a double-word with the condition code in the first byte. The next twelve bits contain the maximum length of the text and the next sixteen bits contain the actual length of the text string. The second word contains the byte address of the text. The length and the byte address of the text are set up in the table INNT. The table INCT contains the three-letter code for each institution.

Two words are also returned at location INSTITUT and INSTITUT + 1. The first word contains the address of the first word of the table INNT, which is the size of the table. The second word contains the address of the table INCT.

SOFTWARE INTERFACE

A. Linkage - none

B. Parameter List Description - none

C. Return Codes - none

D. Other Entry Points - none

E. OCLC Subroutines Referenced - none

F. OCLC Procedures Referenced

:INN - This procedure generates a double-word word. The first word is generated by the procedure SCW. The second word is the byte address of the text string to be displayed on the terminal.

SCW - This procedure generates one word, the first bit of which contains a '4' to be used as a condition code by the program CAT. The next twelve bits contain the maximum length of the text. The next sixteen bits contain the actual length of the text.

Example 1:

In BPT, the institution table is used to check billing codes.

```
    CW,R3           *INSTITUT
```

This instruction will compare the contents of R3 with the contents of INSTITUT which is the length of the table INNT.

Example 2

```
LW,R5               *INSTITUT + 1, R2
```

This instruction will load into R5 the institution code from the table INCT.

I. FUNCTION

The subroutine OPENTAPE is used to verify the standard OS/360 tape label on the output print tape. OPENTAPE also updates the expiration date on the tape label. If the tape label does not begin with the characters 'VOL 1', a message is printed to the console. If the operator responds with a 'C', the tape is rewound and a read is tried again, otherwise the condition code is set to '1' and the job is aborted. If the volume serial number input by the operator through the console does not match that on the tape, a message is printed on the console. If the operator replies 'C', the tape is rewound and a read is tried again, otherwise, the condition code is set to '1', and the job is aborted. The expiration date on the tape is checked against the current date (or the date input by the operator inthe case of re-runs). If the tape is not expired, a message is written on the operators console. If the operator responds 'C', processing is continued and the date is ignored. Otherwise the job is aborted. The new expiration date that was passed in the parameter list is written in the header on the tape. The condition code is set to '0' and control is returned through R15.

II. SOFTWARE INTERFACE

A. Linkage

The calling sequence is:

```
LI,R4      #OTPARMS
BAL,R15    OPENTAPE
DATA       OUTUNIT      Output unit
DATA       WORKAREA     workarea
DATA       VOLSER       volume serial
DATA       DS#          data set number
DATA       INOUT        displacement
DATA       DSNAME       data set name
DATA       EXPDATE      expiration date
DATA       RECFM        record format
DATA       BLKSZ        output block size
DATA       OLRECL       output record length
DATA       CONCODE      condition code
```

Where #OTPARMS is the number of parameters passed.

B. Parameter List Description

The parameters are passed as described above.

C. Return Code:

Condition Code = 0 for normal return.

Condition Code = 1 for abnormal return.

D. Other Entry Points:

CLOSTAPE

E. OCLC Subroutine Referenced - none

F. OCLC Procedures Referenced - none

I. FUNCTIONS

The subroutine CLOSETAPE is used to verifv the OS/360 standard trailer label. CLOSETAPE puts the double tape mark at the end of the print tape.

II. SOFTWARE INTERFACE

A. Linkage

The calling sequence is:

```
LI,R14     #CPARMS
BAL,R15    CLOSTAPE
DATA       WORKAREA      workarea
DATA       #BLAKS        no. of physical blocks
DATA       CONCODE       condition code
```

Where #CPARMS is the number of parameters passed.

B. Parameter List Description

The parameters are passed as described above.

C. Return Codes

Condition Code = 0 for normal return
= 5 for I/O error
= 6 for EOT on
= 7 tape not opened or invalid workarea
= 8 trailer labels were not located

D. Other Entry Points - none

E. OCLC Subroutines Referenced - none

F. OCLC Procedures Referenced - none